Lymph Node/Tumor SUVmax Ratio Can Predict Metastasis to Mediastinal Lymph Nodes in Lung Cancer Patients

To the Editor:

We were interested to read the article by Evison et al.[1] published in the January 2015 issue of *Journal of Thoracic Oncology*. We appreciated the idea of proposing a risk stratification model for negative lymph nodes by endobronchial ultrasound guided transbronchial needle aspiration (EBUS-TBNA) in lung cancer patients. The proposed model increased the negative predictive value of EBUS-TBNA from 91%[2] to approximately 99%. We believe that this model can help to discriminate patients that may directly proceed to curative treatment after a negative EBUS-TBNA. On the basis of this model, an EBUS-TBNA negative lymph node needs no further evaluation if the lymph node maximum standardized uptake value (SUVmax) is lower than 4, the SUVmax ratio between lymph node and primary tumor (LN/T SUVmax) is lower than 0.4, and the lymph node has homogeneous echogenecity during ultrasonographic assessment.[1]

In the absence of distant metastasis, proper staging of mediastinum is of great importance for identification of patients who are candidates for radical curative therapies. Although positron emission tomography/computed tomography (PET/CT) can never replace pathological staging, it is regarded as the most accurate imaging modality for nodal staging. However, there are a significant number of false positivity (underlying inflammatory processes, such as immune reaction because of presence of tumor, obstructive pneumonia, anthracosis, or granulomatous inflammation) and false negativity (microscopic metastasis beyond spatial resolution of PET/CT).

In the literature, there are different declared PET positivity criteria for a lymph node, but are not well validated.[3] A SUVmax level higher than the mediastinal blood pool is associated with increased probability of malignancy and higher sensitivity, but lower specificity.[1,4] Using a cutoff level as "SUVmax higher than 2.5" is sometimes low for predicting malignancy because of common inflammatory conditions. In the study by *Evison* et al., using a SUVmax value higher than 4 to indicate PET positivity leads to a diagnostic performance as follows: sensitivity, 89.9%; specificity, 89.6%; negative predictive value, 85.8%; positive predictive value 92.6%, and diagnostic accuracy 89.8%.[1]

A LN/T SUVmax ratio was first defined by Cerfolio et al. as a universal predictor of lymph node metastasis to eliminate the variation of SUVmax among different PET scanners. They documented that a ratio of 0.56 or higher predicts the node to be malignant with a chance of 94%.[5] After that study, we proposed a level of 0.2, which is lower than the study by Cerfolio et al. This low ratio was probably because of our study population who were early stage cases directly referred to surgical resection. None of them have a lymph node larger than 1 cm in short axis diameter on CT. Besides, we considered a lymph node as positive if there was a fluoro-deoxy-D-glucose (FDG) uptake higher than the surrounding mediastinal tissue. Therefore the number of pathologically positive lymph nodes was extremely low (%14).[4]

Evison et al. is the first who suggested a LN/T SUV max ratio of 0.4 and validated it. We think that using such a LN/T SUVmax ratio instead of a SUVmax threshold can be important for tumors with low FDG activities. A tumor with a low FDG activity (for example low-grade adenocarcinomas) might have a metastatic lymph node with low FDG activity. We wonder if Evison et al. realized such cases in their study group especially in EBUS-TBNA positive cases.

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Reply to: "Lymph Node/Tumor SUVmax Ratio Can Predict Metastasis to Mediastinal Lymph Nodes in Lung Cancer Patients"

In Response:

We welcome the correspondence from Professor Koksal and Dr. Ozmen in regard to our manuscript published in the Journal of Thoracic Oncology. In particular, we welcome the opportunity to correspond with some of the first authors to investigate the potential value of the "standardized uptake value

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